LeeRAIsPEm Resource

From: Brian Hughes
Sent: Wednesday, October 29, 2008 11:49 AM
To: LeeRAIsPEm Resource
Subject: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 044 RELATED TO SRP SECTION 02.05.04 - STABILITY OF SUBSURFACE MATERIALS AND FOUNDATIONS APPLICATION FORTHE WILLIAM STATES LEE III UNITS 1 AND 2 COMBINED LICENSE APPLICATION
Attachments: LEE-RAI-LTR-044.doc

Hearing Identifier: Lee_COL_RAI
Email Number: 54

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Subject: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 044 RELATED TO SRP SECTION 02.05.04 - STABILITY OF SUBSURFACE MATERIALS AND FOUNDATIONS APPLICATION FORTHE WILLIAM STATES LEE III UNITS 1 AND 2 COMBINED LICENSE APPLICATION
Sent Date: 10/29/2008 11:49:01 AM
Received Date: 10/29/2008 11:50:09 AM
From: Brian Hughes

Created By: Brian.Hughes@nrc.gov

Recipients:
"LeeRAIsPEm Resource" <LeeRAIsPEm.Resource@nrc.gov>
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October 29, 2008

Mr. Peter S. Hastings, P.E.
Licensing Manager, Nuclear Plant Development
Duke Energy
526 South Church Street
Charlotte, NC 28201-1006

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 044 RELATED TO SRP SECTION 02.05.04 - STABILITY OF SUBSURFACE MATERIALS AND FOUNDATIONS APPLICATION FORTHE WILLIAM STATES LEE III UNITS 1 AND 2 COMBINED LICENSE APPLICATION

Dear Mr. Hastings:

By letter dated December 12, 2007, as supplemented by letters dated January 28, 2008, February 6, 2008 and February 8, 2008, Duke Energy submitted its application to the U. S. Nuclear Regulatory Commission (NRC) for a combined license (COL) for two AP1000 advance passive pressurized water reactors pursuant to 10 CFR Part 52. The NRC staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter.

To support the review schedule, you are requested to respond within 30 days of the date of this letter. If changes are needed to the final safety analysis report, the staff requests that the RAI response include the proposed wording changes.

If you have any questions or comments concerning this matter, you may contact me at 301-415-6582.

Sincerely,

/**RA**/

Brian Hughes, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-018
52-019

Enclosure:
Request for Additional Information

CC: see next page

P.Hastings

If you have any questions or comments concerning this matter, you may contact me at 301-415-6582.

Sincerely,

/**RA**/

Brian Hughes, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-018
52-019

eRAI Tracking No. 1473
Enclosure:
Request for Additional Information

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DATE	10/15/08	10/10/08	10/17/05/08	10/28/08

*Approval captured electronically in the electronic RAI system.

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Request for Additional Information No. 1473

10/29/2008

William States Lee III, Units 1 and 2
Duke Energy Carolinas, LLC
Docket No. 52-018 and 52-019
SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Application Section: 2.5.4

QUESTIONS for Geosciences and Geotechnical Engineering Branch 1 (RGS1)

02.05.04-1

FSAR Section 2.5.4.8, “Liquefaction Potential” states: “In meeting the requirements of 10 CFR Parts 50 and 100, if the foundation materials at the site adjacent to and under Category I structures and facilities are saturated soils and the water table is above bedrock, then an analysis of the liquefaction potential at the site is required.” The compaction criteria is 95% of standard Proctor compacted within 3 % wet of optimum, which does not necessarily preclude liquefaction in the backfill. Given that the AP1000 DCD Tier 1 requirement is for no liquefaction, please provide additional justification/analysis to demonstrate the stability of the backfill during strong ground motion shaking.

02.05.04-2

In FSAR Section 2.5.4.7, “Response of Soil and Rock to Dynamic Loading," Figures 2.5.4-253 and 2.5.4-254, you present the RCTS testing performed in conformance with the requirements of Regulatory Guide 1.138. There is variability in the RCTS test data over the range of testing pressures and the plotted test data lie outside beyond the limits of the two selected EPRI curves. Please justify how the selected curves represent the site-specific test data.

02.05.04-3

FSAR Figure 2.5.4-240 shows adjacent borings 1074 and 1074A at the northwest edge of the Lee Unit 1 nuclear island. The near surface Rock Quality Designations (RQDs) for these two core borings are quite dissimilar, with boring 1074 not demonstrating sound rock (RQD > 65%) until approximately El. 505. Figure 2.5.4-245 shows conceptually the planned excavation to continuous rock at that location. Please describe how you will ensure that your excavation scheme will meet your design assumptions for continuous rock (RQD > 65%). Also, If rock of lower RQD and less structural integrity remains after the excavation reaches the final depth, please describe how this will affect the dynamic bearing capacity of the northwest corner.

02.05.04-4

FSAR Table 2.5.4-211, note "h" states, “The design engineer (i.e., engineer that will use data for design) must give careful consideration to compressibility and strength

parameters based on test data, and the values reported in this table are estimates." This note applies to the existing soils, fill soils and partially weathered rock for the following parameters: overconsolidation ratio, preconsolidation pressure, compression index, re-compression index, consolidation coefficient, total cohesion, total friction angle, effective cohesion, and effective friction angle. Since the nuclear islands are founded on either rock or concrete overlying rock, please confirm that this comment does not refer to the foundation support of the nuclear island. Please also clarify how this data was used in the design of safety related structures. If any aspect of the design of safety related structures depended on assumed or estimated soil properties, please justify using estimated strength parameters for that purpose.

02.05.04-5

Section 2.5.4.7.4.1 of the FSAR states, "The rock conditions described for the Lee Nuclear Station Unit 1 nuclear island northwest corner have no practical significance on differential shear wave velocity, site amplification or foundation performance and comply with the subsurface uniformity criteria as described in DCD Subsection 2.5.4.5." Please clarify the statement, i.e., does the statement refer only to rock motions under the Lee Unit 1 nuclear island? Does the statement also refer to the non-uniform overburden and fill conditions above the rock? Figure 2.5.4-245 shows a significant difference between the combined overburden and backfill depths east and west of Lee Unit 1. Please describe how the variable site conditions above the rock were considered in the liquefaction analyses.

02.05.04-6

The bearing capacity for Lee Units 1 and 2, described in FSAR Section 2.5.4.10.1 "Bearing Capacity," was calculated based on the strength of continuous rock properties (Rock Quality Designation, RQD > 65%) and/or intact rock strength. Both methods indicated a substantial bearing capacity greater than the bearing demand. Under the northwest edge of Unit 1, the borings indicate rock of lesser RQD. Please describe whether the bearing capacity of the rock mass under the northwest corner of Unit 1 was determined for comparison with the dynamic bearing demand. Please also provide the allowable bearing capacity of the rock mass under the northwest corner of Unit 1. What is the factor of safety considering the dynamic bearing demand of 35,000 psf?

02.05.04-7

FSAR Figure 2.5.4-229, left-side, shows two different scales along the X-axes, top and bottom. Please correct the figure.

02.05.04-8

FSAR Section 2.5.4.10.3, "Lateral Earth Pressures" does not include the dynamic lateral stresses. According to AP1000 DCD, Tier 2, Section 2.5.4.6.7, "Earth Pressures," "The Combined License applicant will describe the design for static and dynamic lateral earth pressures and hydrostatic groundwater pressures acting on plant safety-related facilities

using soil parameters as evaluated in previous subsections." Please provide dynamic lateral earth pressures acting on the nuclear island below grade walls.

02.05.04-9

AP1000 DCD, Tier 2, Section 2.5.4.5.3.1, "Site-Specific Subsurface Uniformity Design Basis" states in part: "The key attribute for acceptability of the site for an AP1000 is the bearing pressure on the underside of the basemat. A site having local soft or hard spots within a layer or layers does not meet the criteria for a uniform site." Please clarify how the Lee Unit 1 site meets the uniformity criteria given the shear wave velocity differences between the centerline of Unit 1 and the northwest corner of Unit 1.